

CLAIMS:

1. A roadside traffic monitoring system, comprising:
 - a primary sensor for measuring a parameter of vehicles passing a measurement
5 point;
 - a secondary sensor for measuring the same parameter of vehicles as they pass the measurement point, the secondary sensor able to measure the parameter to a higher level of accuracy than the primary sensor under predetermined conditions;
 - a conditions sensor for determining when the predetermined conditions are met;
10 and
 - verification means for comparing the parameter as measured by the primary sensor with the parameter as measured by the secondary sensor if the predetermined conditions are met.
- 15 2. A roadside traffic monitoring system as claimed in claim 1, further comprising synchronisation means for ensuring that the parameter as measured by the primary sensor and the parameter as measured by the secondary sensor are measured at the same moment in time.
- 20 3. A roadside traffic monitoring system as claimed in claim 1 or 2, wherein the conditions sensor is included in the primary sensor or the secondary sensor.
4. A roadside traffic monitoring system as claimed in any preceding claim, wherein the primary sensor comprises a loop sensor.
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5. A roadside traffic monitoring system as claimed in claim 1, 2 or 3, wherein the primary sensor comprises a video detection system.
6. A roadside traffic monitoring system as claimed in any of claims 1 to 4, wherein
30 the secondary sensor comprises a video detection system.

7. A roadside traffic monitoring system as claimed in any of claims 1 to 5, wherein the measured parameter is the speed of vehicles passing the measurement point.
8. A roadside traffic monitoring system as claimed in claim 7, wherein the
5 secondary sensor comprises a radar device for measuring the Doppler shift caused by approaching vehicles.
9. A roadside traffic monitoring system as claimed in claim 8, wherein the distance and direction from the radar device to the measurement point is known so that errors in
10 the radar device reading caused by the cosine effect can be accounted for.
10. A roadside measuring system as claimed in claim 8 or 9, wherein the predetermined conditions are met if:
a single vehicle passes the measurement point with at least a predetermined time
15 before and after the passage of said single vehicle during which no other vehicles pass the measurement point.
11. A roadside traffic monitoring system as claimed in claim 10, wherein the predetermined time is about one second.
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12. A roadside traffic monitoring system as claimed in any of claims 1 to 6, wherein the measured parameter is vehicle density or number.
13. A roadside traffic monitoring system as claimed in any preceding claim,
25 arranged to determine an uncertainty in the primary sensor from a comparison of the parameter as measured by the secondary sensor with the parameter as measured by the primary sensor.
14. A roadside traffic monitoring system as claimed in claim 13, arranged so that the
30 uncertainty in the primary sensor is determined from a series of comparisons of the

parameter as measured by the secondary sensor with the parameter as measured by the primary sensor.

15. A roadside traffic monitoring system as claimed in claim 13 or 14, wherein the
5 uncertainty in measurements made by the secondary sensor is known and is used to weight the significance of assessments of the uncertainty of the primary sensor.

16. A roadside traffic monitoring system as claimed in claim 13, 14 or 15, arranged
10 to alert an operator if the uncertainty changes more than a predetermined amount.

17. A roadside traffic monitoring system as claimed in any of claims 13 to 16,
arranged to monitor the standard deviation of the uncertainty of the primary sensor and
compare it with a predetermined value.

18. A roadside traffic monitoring system as claimed in claim 17, arranged to alert an
15 operator if the standard deviation deviates from the predetermined value by more than a predetermined amount.

19. A roadside traffic monitoring system as claimed in any of claims 12 to 18,
20 arranged so that the primary sensor is recalibrated in response to a difference between the parameter as measured by the secondary sensor and the parameter as measured by the primary sensor if the predetermined conditions are met.

20. A roadside traffic monitoring system as claimed in any preceding claim, wherein
25 the roles of the primary and secondary sensors are reversible so that the primary sensor is usable to calibrate the secondary sensor.

21. Apparatus for assessing the accuracy of a roadside traffic measurement station
(TMS) having a primary sensor for measuring a parameter of vehicles passing a
30 predetermined measurement point and the moment in time at which each vehicle passes the measurement point, the apparatus comprising:

a secondary sensor arranged to record the same parameter of vehicles as they pass the predetermined measurement point, the second parameter sensor being more accurate than the first parameter sensor if predetermined conditions are met;

condition measurement means for determining when said predetermined
5 conditions are met; and

verification means for comparing the parameter as measured by the secondary parameter measurement means when the predetermined conditions are met with the parameter as measured by the primary parameter measurement means.

10 22. A method of monitoring a parameter of vehicles, comprising:
measuring the parameter of a vehicle at a measurement point using a primary sensor;

determining whether predefined conditions are met;

measuring the parameter of the vehicle at the measurement point using a
15 secondary sensor, the secondary sensor being more accurate than the primary sensor if the predefined conditions are met; and

if the predefined conditions are met, using the difference between the parameter as measured by the secondary sensor and the parameter as measured by the primary sensor to determine an uncertainty in the measurement of the primary sensor.

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23. A point speed measurement system, comprising:

a Doppler-effect speed sensor; and

a vehicle detection system arranged to trigger the Doppler-effect speed sensor when a vehicle is at a predetermined measurement position, the distance and direction
25 from the Doppler-effect speed sensor to the predetermined measurement point being known;

arranged so that the output from the Doppler-effect speed sensor is adjusted to compensate for the cosine effect at the predetermined measurement position.

30 24. A data sensing system, comprising:

a primary sensor for measuring a parameter value;

a secondary sensor for measuring the same parameter value as the primary sensor, the secondary sensor able to measure the parameter value more reliably than the primary sensor under predetermined conditions;

a conditions sensor for determining when the predetermined conditions are met;

5 synchronisation means for ensuring that the primary sensor and secondary sensor measure the parameter value at the same time; and

validation means for comparing the parameter value as measured by the primary sensor with the parameter value as measured by the secondary sensor if the predetermined conditions are met.

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25. A method of validating a primary data sensor, comprising:

measuring a parameter with the primary sensor;

measuring the same parameter with a secondary sensor, the secondary sensor being more accurate than the primary sensor under predefined conditions;

15 determining whether the predefined conditions have been met; and

comparing the parameter as measured by the primary sensor with the parameter as measured by the secondary sensor if the predefined conditions are met.